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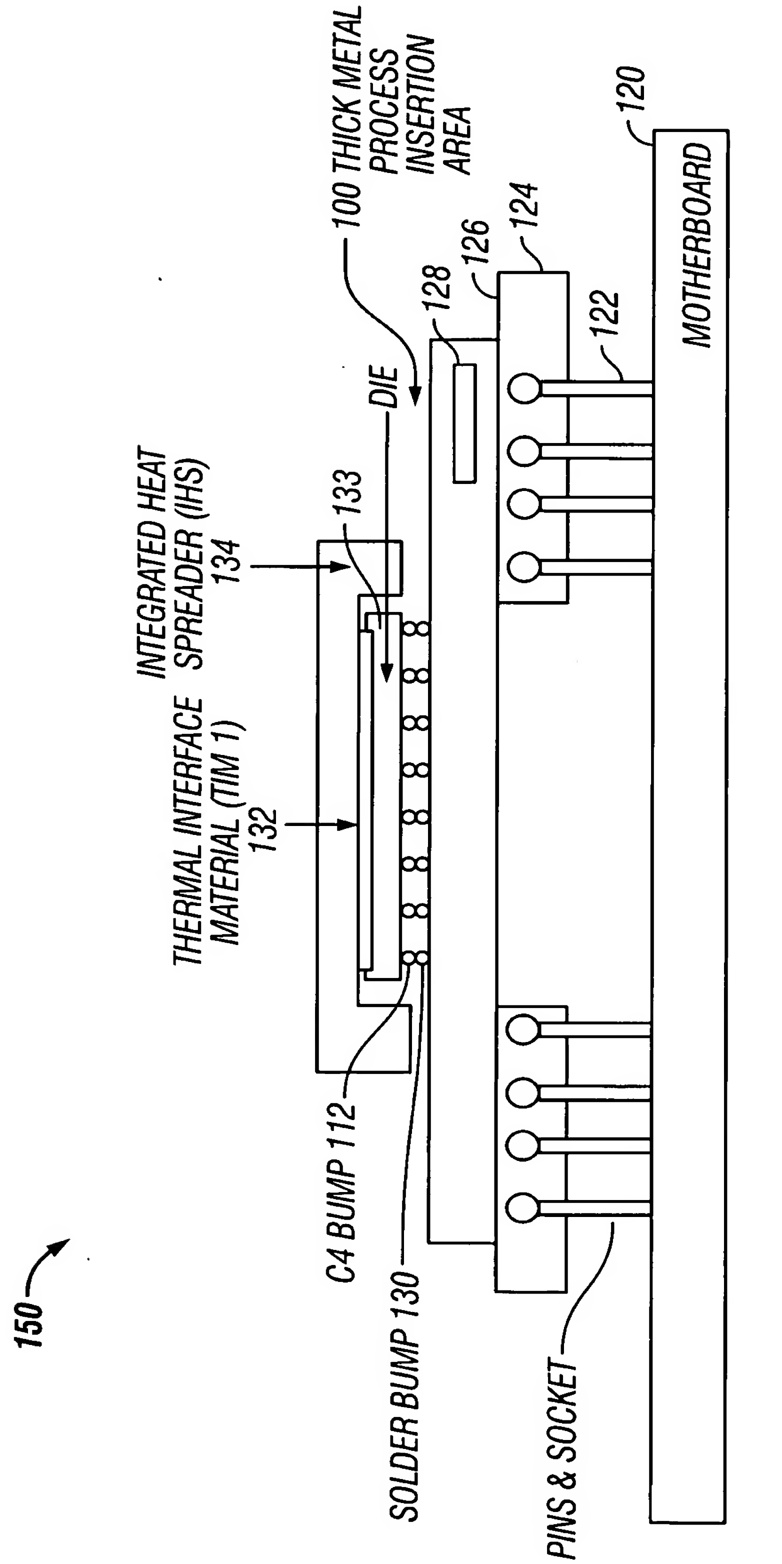

FIG. 1A

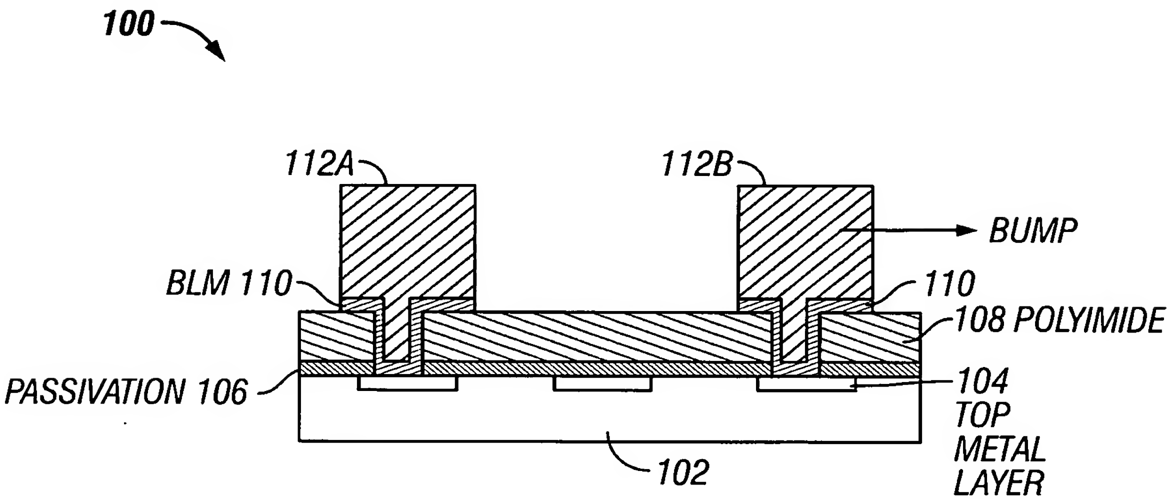
100
112A
112B
BUMP
BLM 110
110
108 POLYIMIDE
PASSIVATION 106
104
TOP
METAL
LAYER
102

FIG. 1B

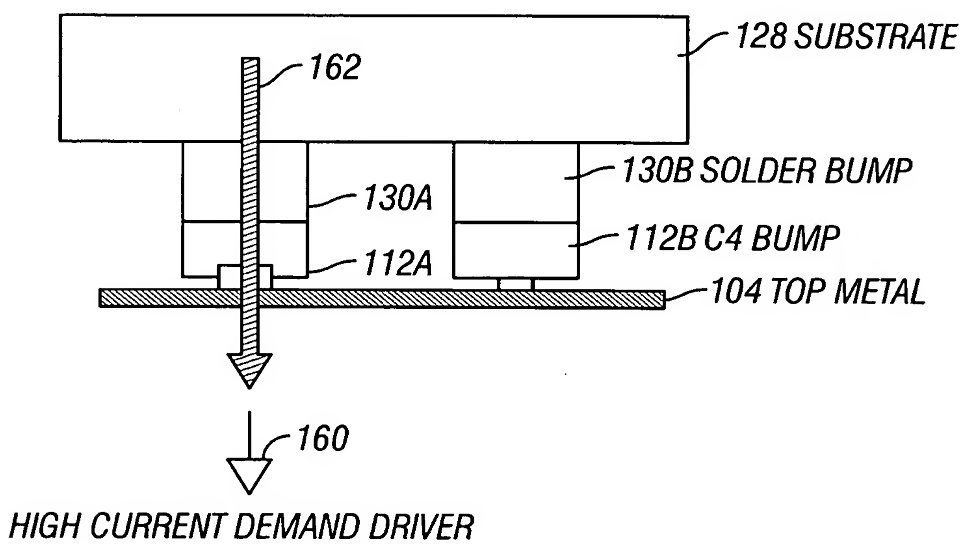
128 SUBSTRATE
162
130B SOLDER BUMP
130A
112B C4 BUMP
112A
104 TOP METAL
160
HIGH CURRENT DEMAND DRIVER

FIG. 1C

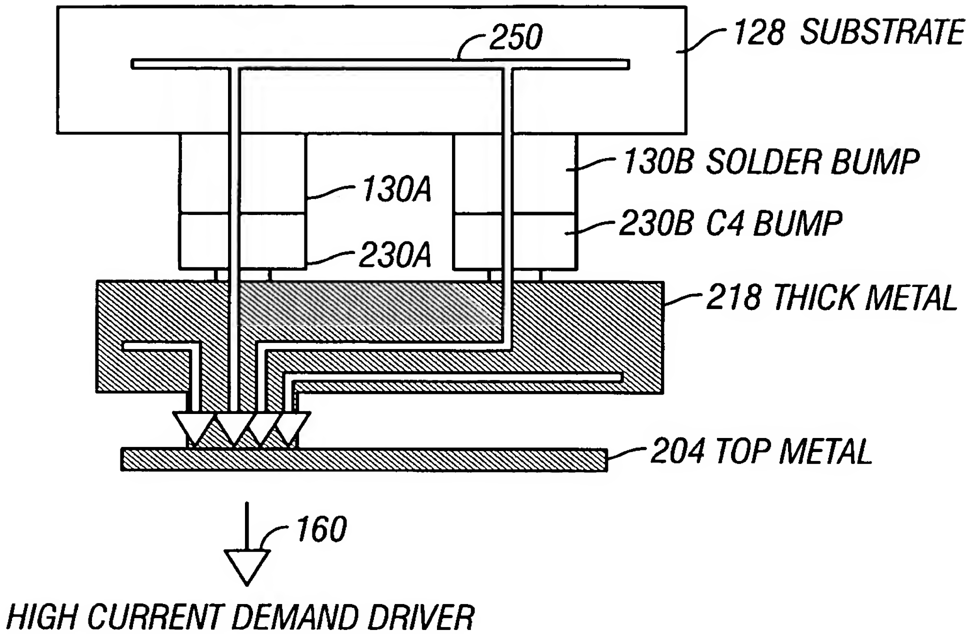
250
128 SUBSTRATE
130B SOLDER BUMP
130A
230B C4 BUMP
230A
218 THICK METAL
204 TOP METAL
160
HIGH CURRENT DEMAND DRIVER

FIG. 1D

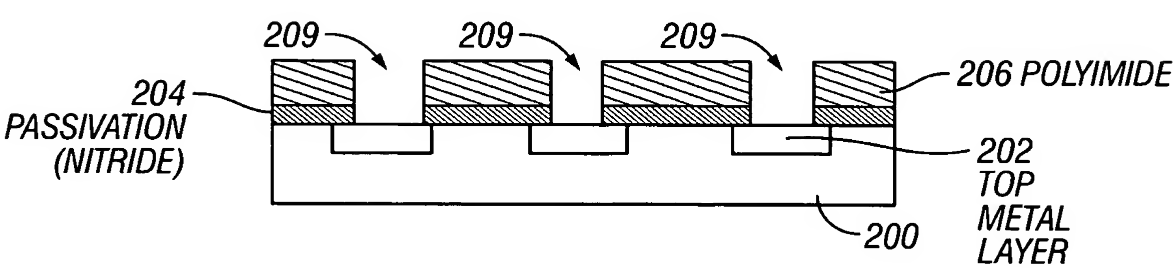
209
209
209
204
PASSIVATION
(NITRIDE)
206 POLYIMIDE
202
TOP
METAL
LAYER
200

FIG. 2

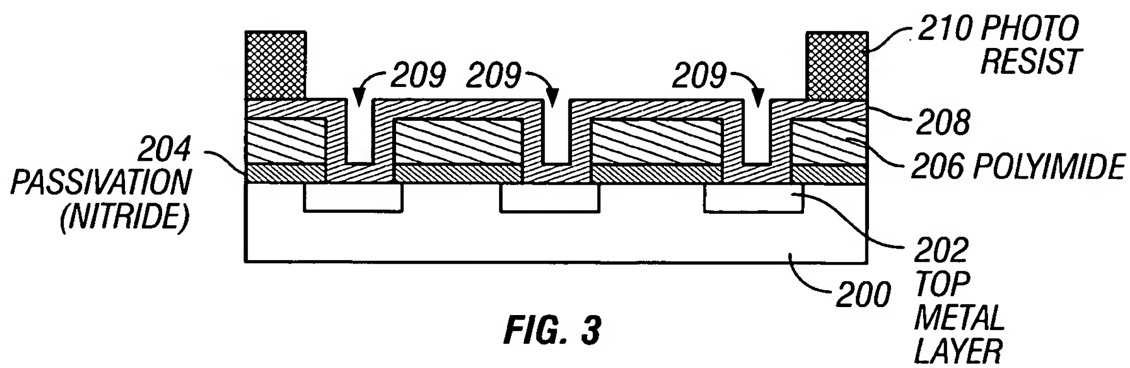

FIG. 3

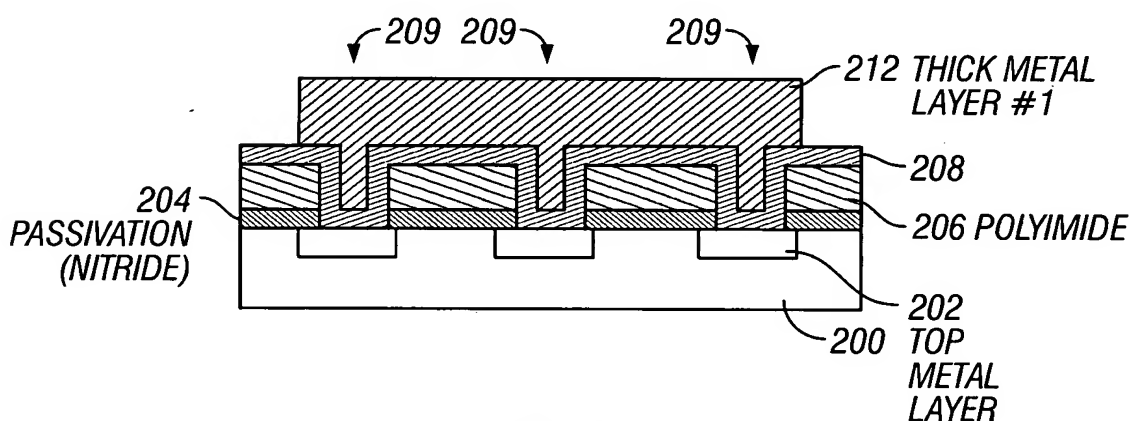

FIG. 4

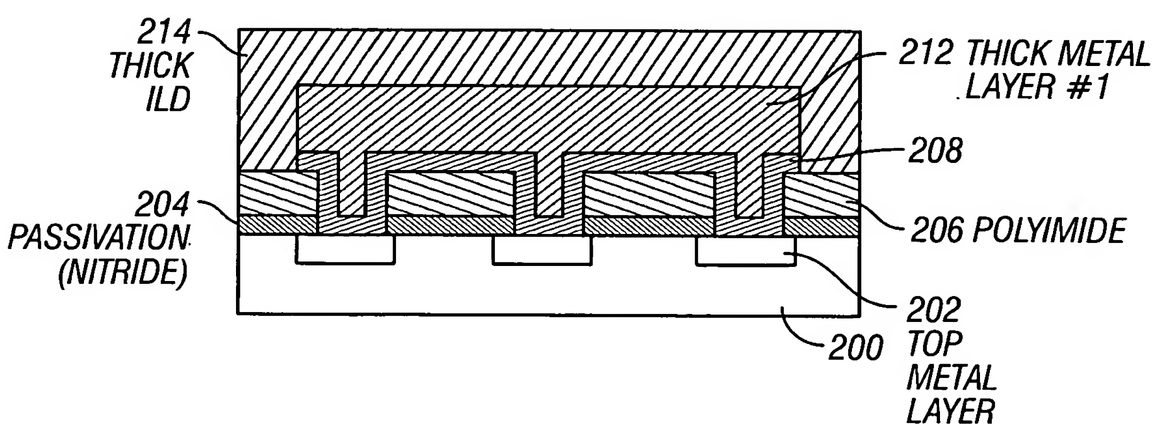

FIG. 5

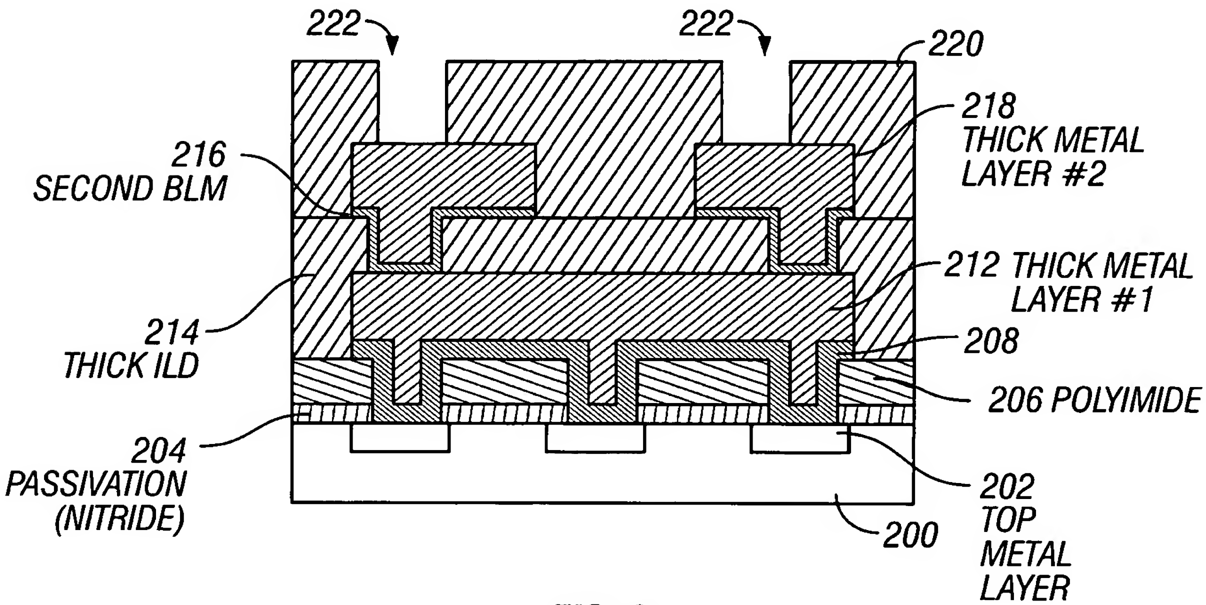
222
222
220
218
THICK METAL
LAYER #2
216
SECOND BLM
212 THICK METAL
LAYER #1
214
THICK ILD
208
206 POLYIMIDE
204
PASSIVATION
(NITRIDE)
202
TOP
METAL
LAYER
200

FIG. 6

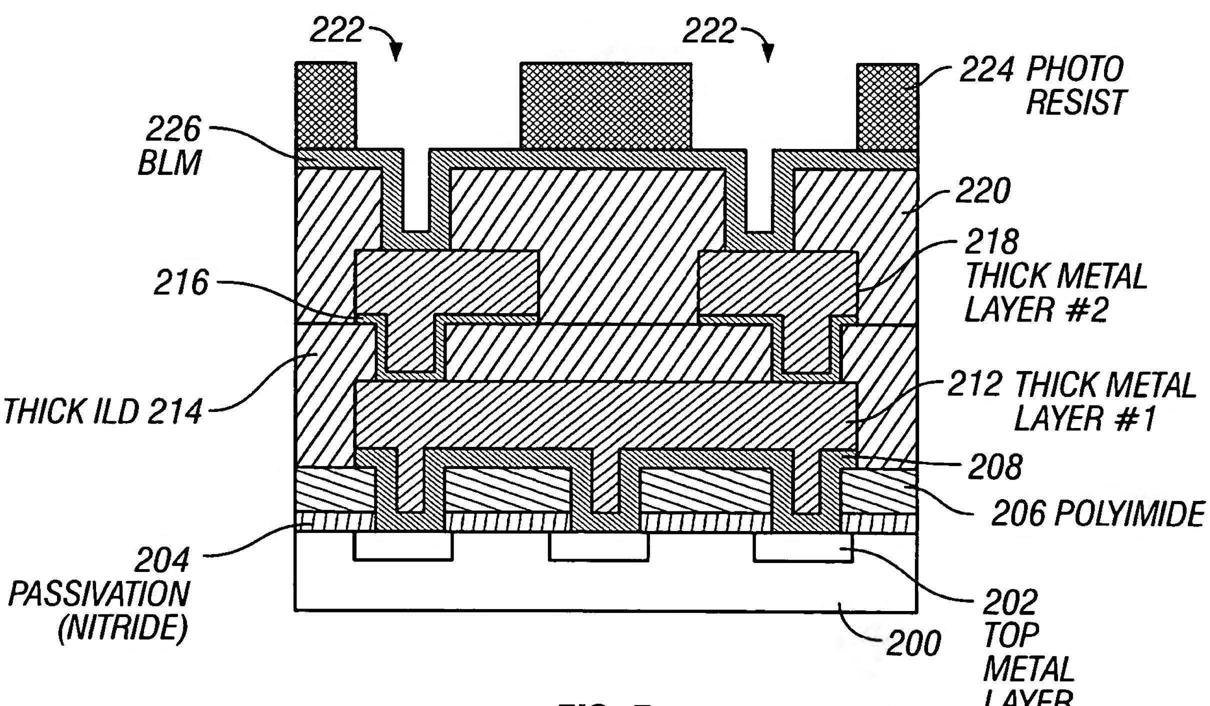
222
222
224 PHOTO
RESIST
226
BLM
220
218
THICK METAL
LAYER #2
216
212 THICK METAL
LAYER #1
THICK ILD 214
208
206 POLYIMIDE
204
PASSIVATION
(NITRIDE)
202
TOP
METAL
LAYER
200

FIG. 7

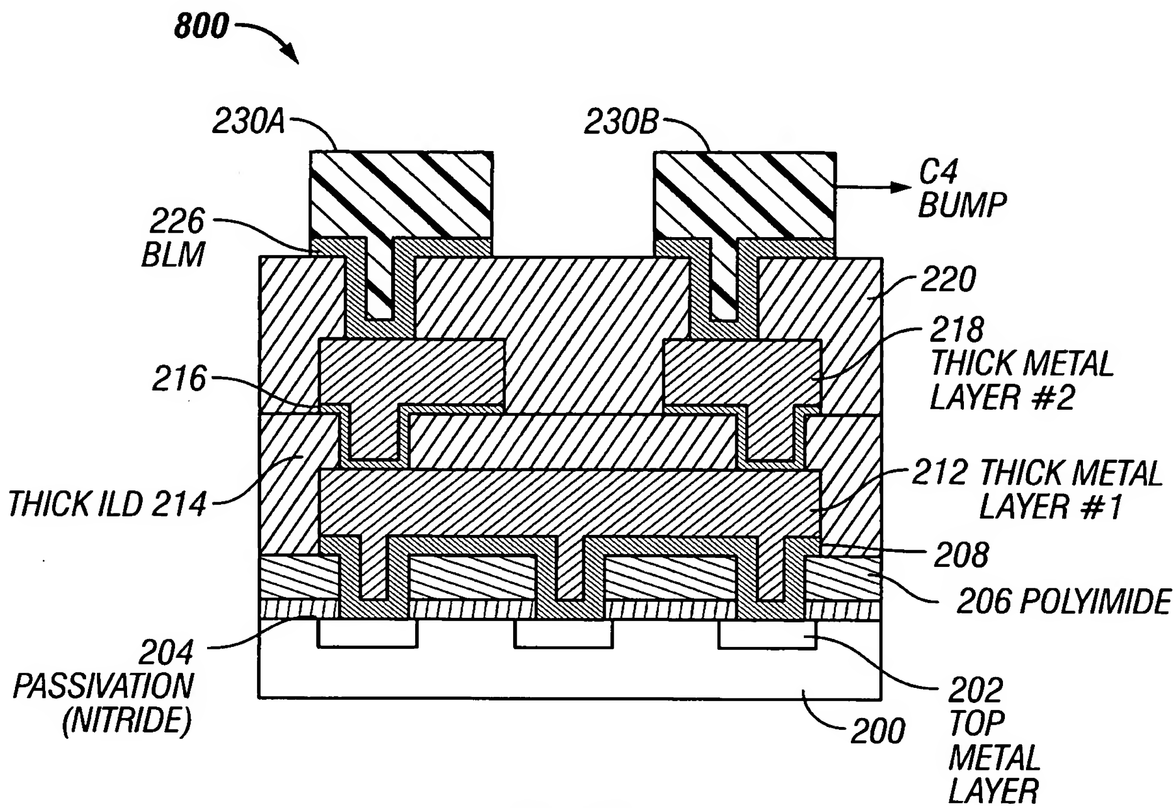
800
230A
230B
C4
BUMP
226
BLM
220
218
THICK METAL
LAYER #2
216
THICK ILD 214
212 THICK METAL
LAYER #1
208
206 POLYIMIDE
204
PASSIVATION
(NITRIDE)
200
202
TOP
METAL
LAYER

FIG. 8A

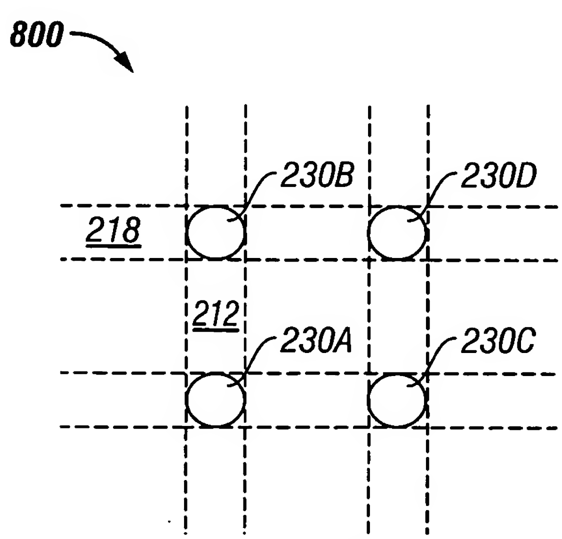
800
230B
230D
218
212
230A
230C

FIG. 8B

	FLOW 1
	1. NO CU DIFFUSION BARRIER NEEDED 2. USE PHOTO-DEFINABLE ILD
900	PASSIVATION DEP (NITRIDE)
902	POLYIMIDE PATTERN
904	DEVELOP POLYIMIDE
906	BLM DEP
908	PR COATING
910	PR (THICK METAL LAYER #1) PATTERN
912	CU PLATING
914	RESIST STRIP
916	BLM ETCH/ASH
918A	DEPOSIT DIELECTRIC (PHOTO-DEFINABLE POLYMER)
920	PHOTO-PATTERN VIAS
922	DEVELOP DIELECTRIC
924	BLM DEP
926	PR COATING
928	PR (THICK METAL LAYER #2) PATTERN
930	CU PLATING
932	RESIST STRIP
934	BLM ETCH/ ASH
936	DEPOSIT DIELECTRIC (PHOTO-DEFINABLE POLYMER)
938	PHOTO-PATTERN VIAS
940	DEVELOP DIELECTRIC
942	BLM DEP
944	PR COATING
946	BUMP PATTERN
948	BUMP PLATING
950	RESIST STRIP
952	BLM ETCH/ASH

FIG. 9A

	FLOW 2
	1. NO CU DIFFUSION BARRIER NEEDED 2. USE PHOTO-DEFINABLE ILD
900	PASSIVATION DEP (NITRIDE)
902	POLYIMIDE PATTERN
904	DEVELOP POLYIMIDE
906	BLM DEP
908	PR COATING
910	PR (THICK METAL LAYER #1) PATTERN
912	CU PLATING
914	RESIST STRIP
916	BLM ETCH/ASH
918B	DEPOSIT DIELECTRIC (SELF-PLANARIZING POLYMER)
954	PR COATING
956	PATTERN VIAS
958	ETCH DIELECTRIC (DRY)
960	PR STRIP
924	BLM DEP
926	PR COATING
928	PR (THICK METAL LAYER #2) PATTERN
930	CU PLATING
932	RESIST STRIP
934	BLM ETCH/ASH
962	DEPOSIT DIELECTRIC (SELF-PLANARIZING POLYMER)
964	PR COATING
966	PATTERN VIAS
968	ETCH DIELECTRIC (DRY)
970	PR STRIP
942	BLM DEP
944	PR COATING
946	BUMP PATTERN
948	BUMP PLATING
950	RESIST STRIP
952	BLM ETCH/ASH

FIG. 9B

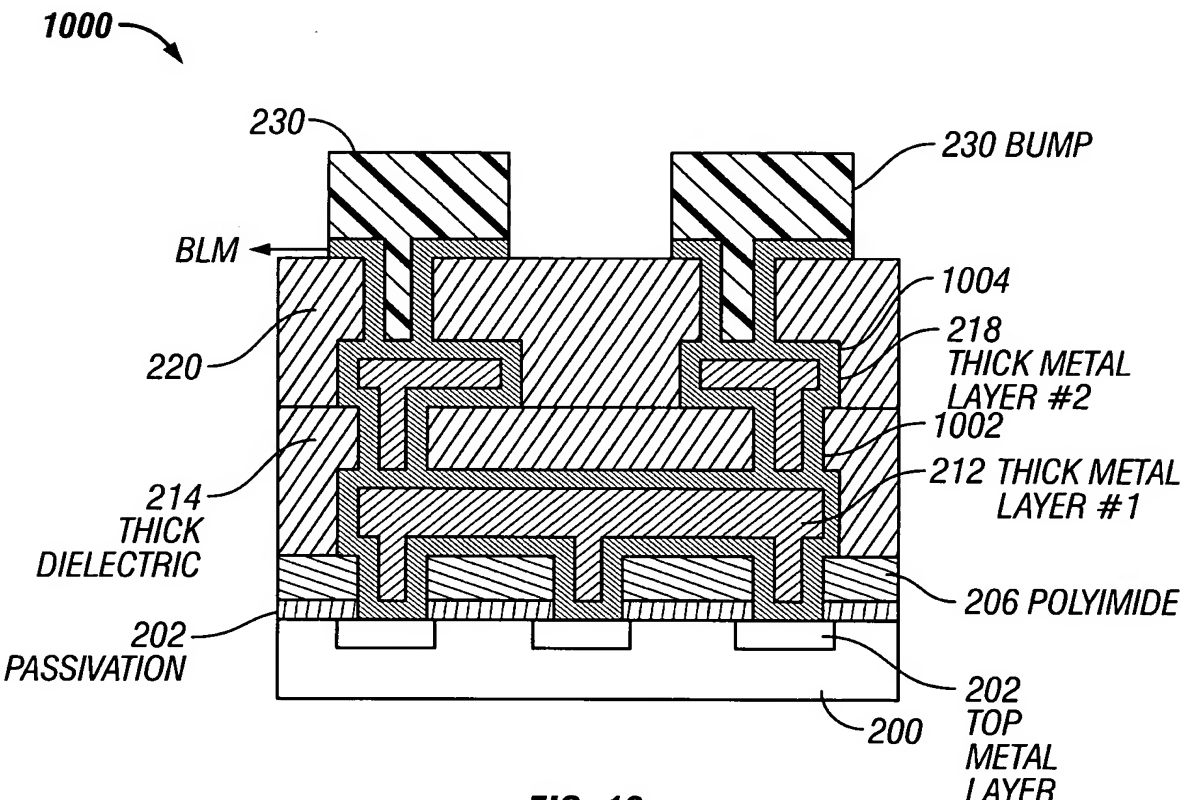
1000
230
230 BUMP
BLM
1004
220
218
THICK METAL
LAYER #2
1002
214
THICK
DIELECTRIC
212 THICK METAL
LAYER #1
206 POLYIMIDE
202
PASSIVATION
202
TOP
METAL
LAYER
200

FIG. 10

	FLOW 3
	1. CU DIFFUSION BARRIER
	2. USE PHOTO-DEFINABLE ILD
900	PASSIVATION DEP (NITRIDE)
902	POLYIMIDE PATTERN
904	DEVELOP POLYIMIDE
906	BLM DEP
908	PR COATING
910	PR (THICK METAL LAYER #1) PATTERN
912	CU PLATING
914	RESIST STRIP
916	BLM ETCH/ASH
1100	EL DIFFUSION BARRIER PLATING
918B	DEPOSIT DIELECTRIC (SELF-PLANARIZING POLYMER)
920	PHOTO-PATTERN VIAS
922	DEVELOP DIELECTRIC
924	BLM DEP
926	PR COATING
928	PR (THICK METAL LAYER #2) PATTERN
930	CU PLATING
932	RESIST STRIP
934	BLM ETCH/ASH
1102	EL DIFFUSION BARRIER PLATING
936	DEPOSIT DIELECTRIC (PHOTO-DEFINABLE POLYMER)
938	PHOTO-PATTERN VIAS
940	DEVELOP DIELECTRIC
942	BLM DEP
944	PR COATING
946	BUMP PATTERN
948	BUMP PLATING
950	RESIST STRIP
952	BLM ETCH/ASH

FIG. 11A

	FLOW 4
	1. CU DIFFUSION BARRIER
	2. USE SELF-PLANARIZING ILD
900	PASSIVATION DEP (NITRIDE)
902	POLYIMIDE PATTERN
904	DEVELOP POLYIMIDE
906	BLM DEP
908	PR COATING
910	PR (THICK METAL LAYER #1) PATTERN
912	CU PLATING
914	RESIST STRIP
916	BLM ETCH/ASH
1100	EL DIFFUSION BARRIER PLATING
918B	DEPOSIT DIELECTRIC (SELF-PLANARIZING POLYMER)
954	PR COATING
956	PATTERN VIAS
958	ETCH DIELECTRIC (DRY)
960	PR STRIP
924	BLM STRIP
926	PR COATING
928	PR (THICK METAL LAYER #2) PATTERN
930	CU PLATING
932	RESIST STRIP
934	BLM ETCH/ASH
1102	EL DIFFUSION BARRIER PLATING
962	DEPOSIT DIELECTRIC (SELF-PLANARIZING POLYMER)
964	PR COATING
966	PATTERN VIAS
968	ETCH DIELECTRIC (DRY)
970	PR STRIP
942	BLM DEP
944	PR COATING
946	BUMP PATTERN
948	BUMP PLATING
950	RESIST STRIP
952	BLM ETCH/ASH

FIG. 11B

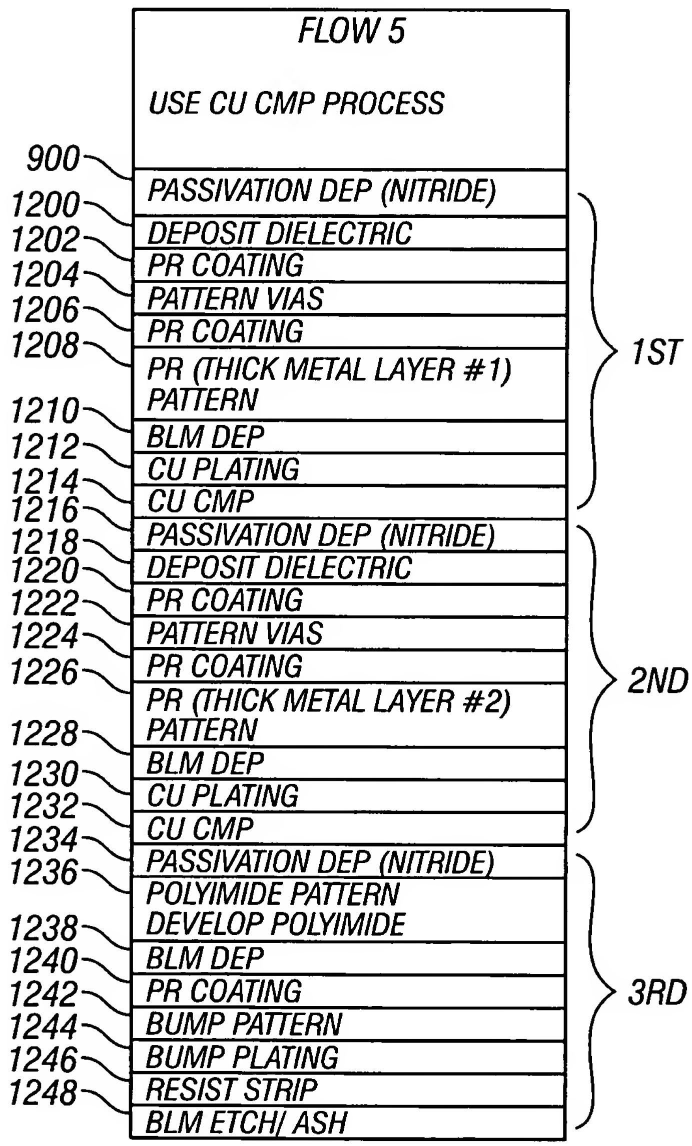
FLOW 5
USE CU CMP PROCESS
900
PASSIVATION DEP (NITRIDE)
1200
DEPOSIT DIELECTRIC
1202
PR COATING
1204
PATTERN VIAS
1206
PR COATING
1208
PR (THICK METAL LAYER #1) PATTERN
1210
BLM DEP
1212
CU PLATING
1214
CU CMP
1ST
1216
PASSIVATION DEP (NITRIDE)
1218
DEPOSIT DIELECTRIC
1220
PR COATING
1222
PATTERN VIAS
1224
PR COATING
1226
PR (THICK METAL LAYER #2) PATTERN
1228
BLM DEP
1230
CU PLATING
1232
CU CMP
2ND
1234
PASSIVATION DEP (NITRIDE)
1236
POLYIMIDE PATTERN DEVELOP POLYIMIDE
1238
BLM DEP
1240
PR COATING
1242
BUMP PATTERN
1244
BUMP PLATING
1246
RESIST STRIP
1248
BLM ETCH/ ASH
3RD

FIG. 12

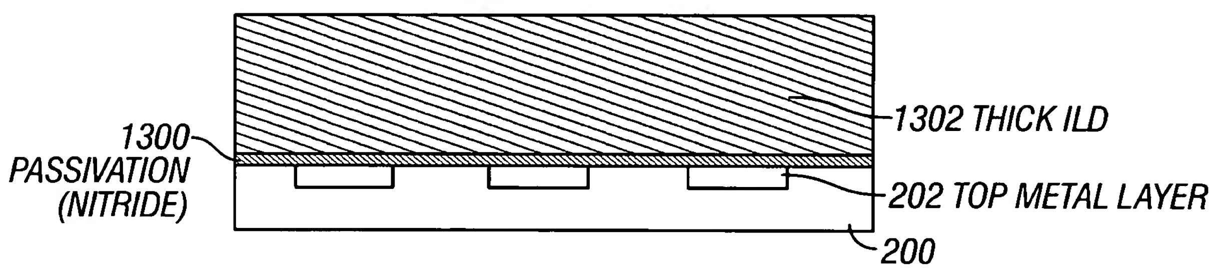

FIG. 13A

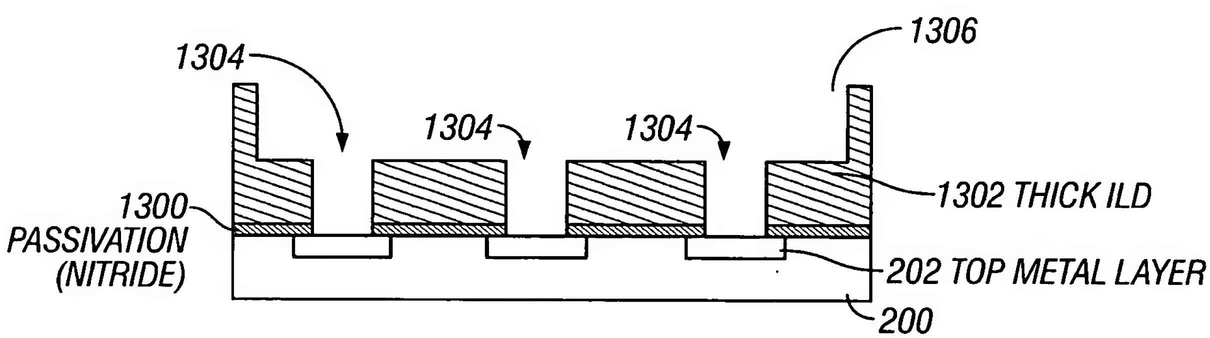

FIG. 13B

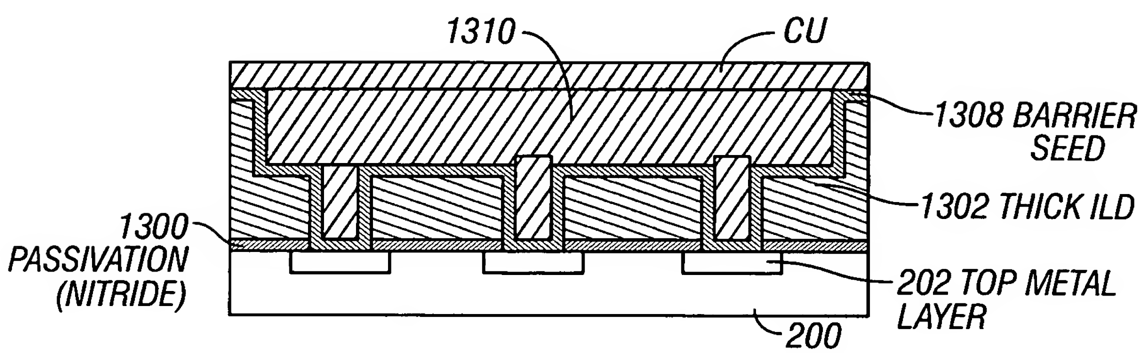

FIG. 13C

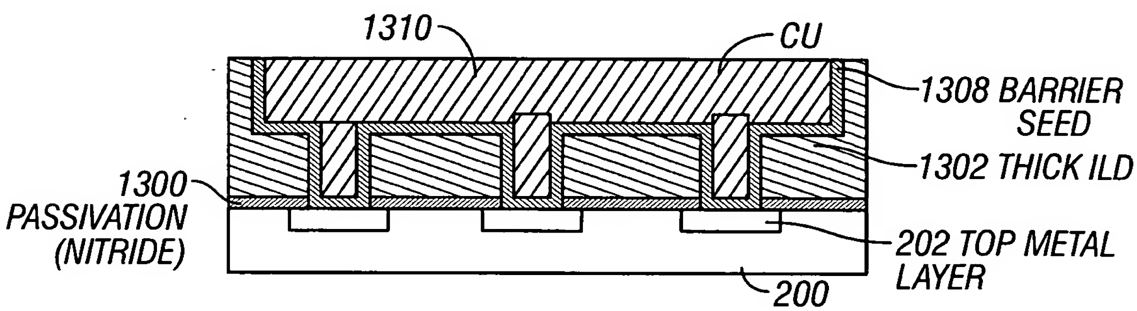

FIG. 13D

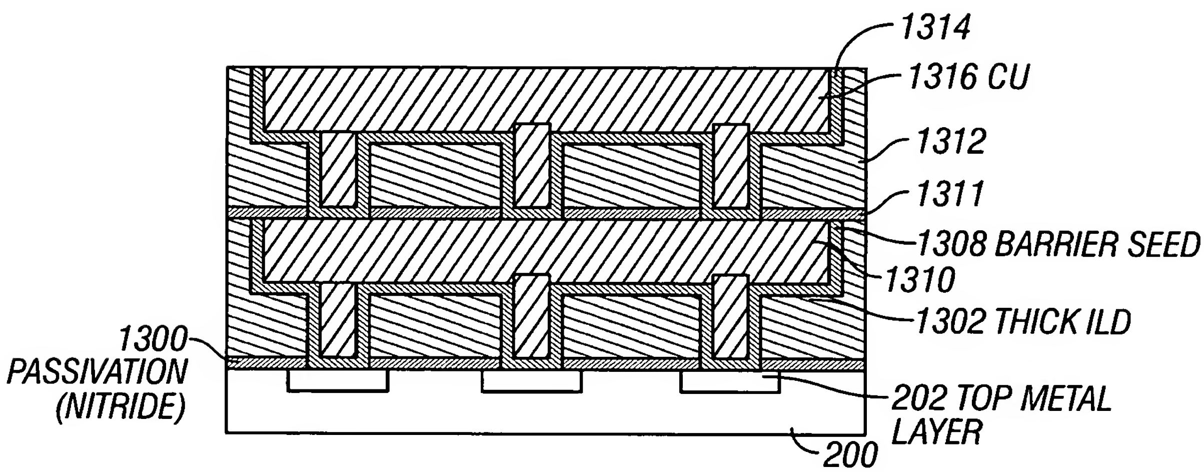

FIG. 13E

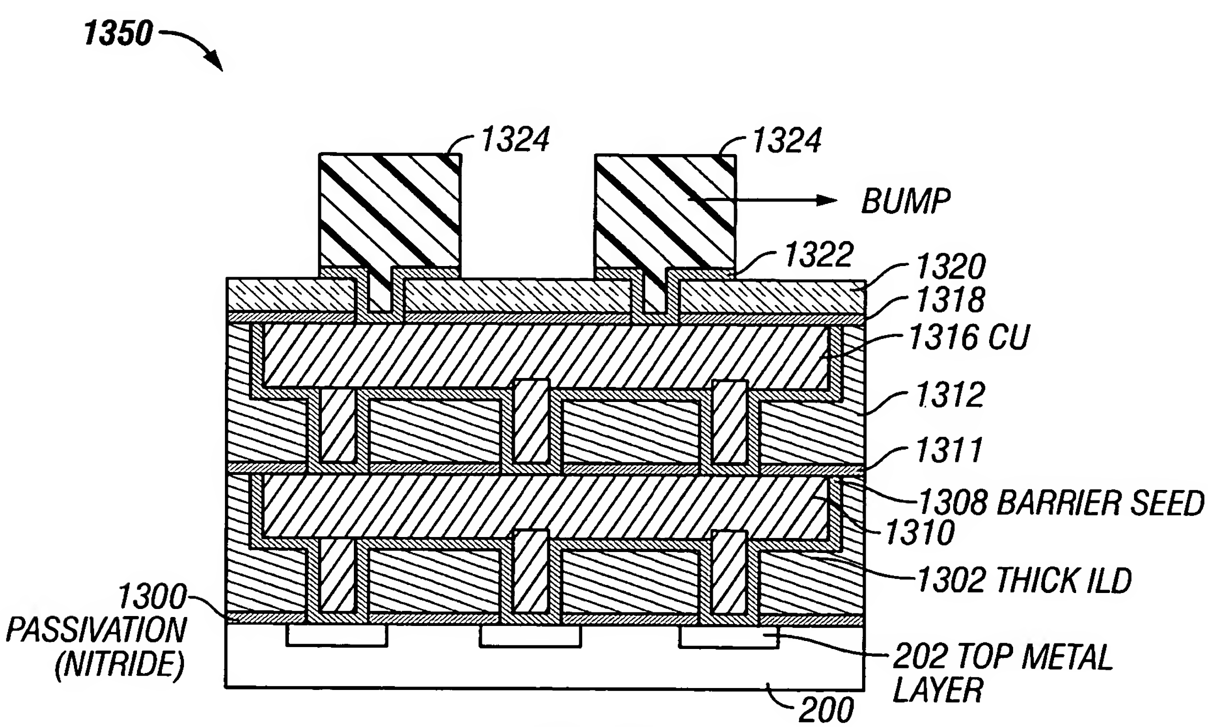

FIG. 13F

	SIMULATION PARAMETERS			RESULTS	
	ADDITION THICK METAL LAYERS	METAL WIDTH	VIA RESISTANCE (MΩ)	IMAX (MA)	IR DROP (MV)
1410	DEFAULT (PRESENT STATE OF ART)			680	29
1400	TWO 45 μM THICK METAL LAYERS	70 μM FOR METAL LAYER #2 100 μM FOR METAL LAYER #1	0.7	430 (36% IMAX IMPROVEMENT)	30
1402	TWO 15 μM THICK METAL LAYERS	70 μM FOR METAL LAYER #2 100 μM FOR METAL LAYER #1	0.7	530 (22% IMAX IMPROVEMENT)	30
1404	TWO 45 μM THICK METAL LAYERS	70 μM FOR METAL LAYER #2 100 μM FOR METAL LAYER #1	70	370 (46% IMAX IMPROVEMENT)	49
1406	TWO 15 μM THICK METAL LAYERS	70 μM FOR METAL LAYER #2 100 μM FOR METAL LAYER #1	70	380 (44% IMAX IMPROVEMENT)	51

FIG. 14

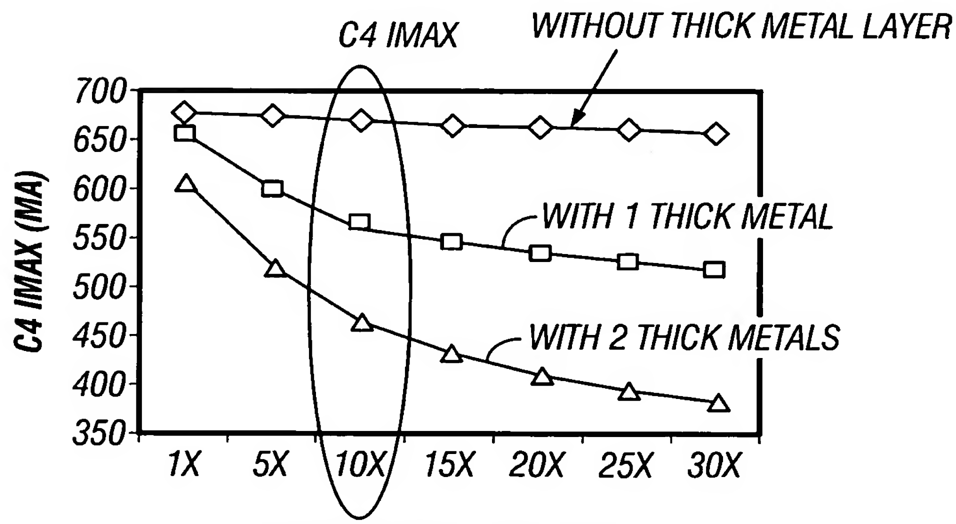

FIG. 15A

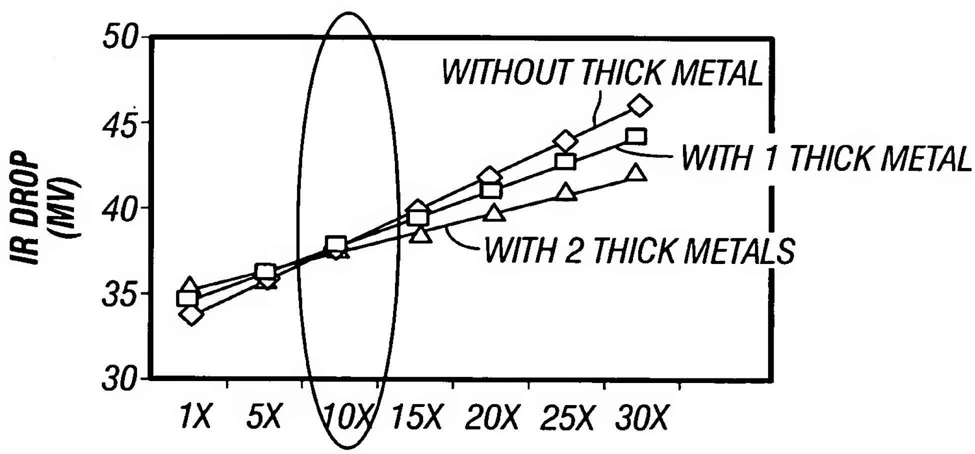

FIG. 15B

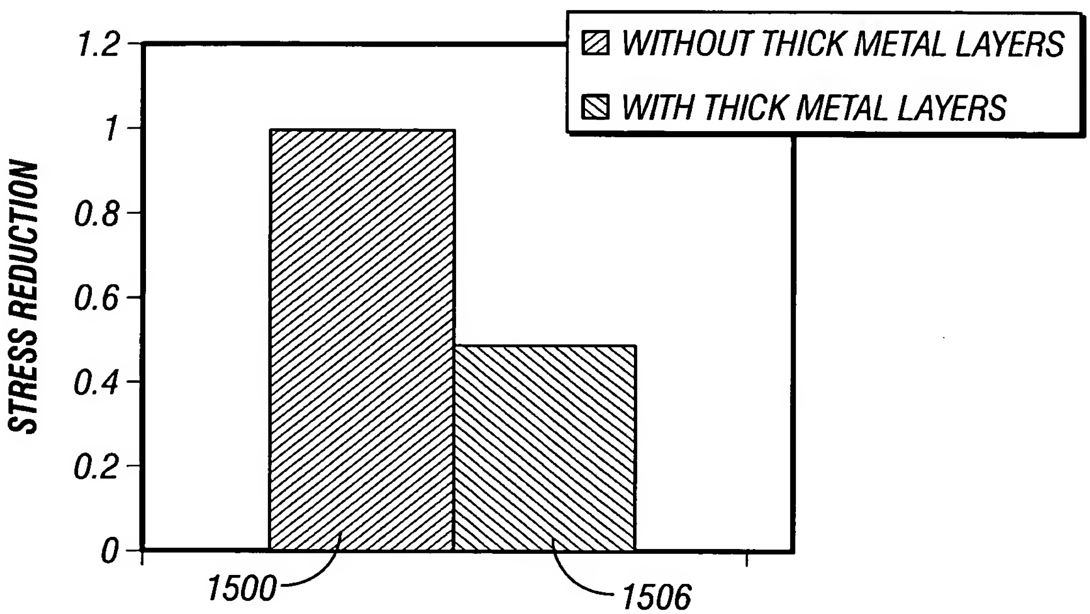
1.2
1
0.8
0.6
0.4
0.2
0
STRESS REDUCTION
WITHOUT THICK METAL LAYERS
WITH THICK METAL LAYERS
1500
1506

FIG. 16